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ABSTRACT:

PURPOSE: To miniaturize a vibrator, by forming a cavity by a silicon substrate and a silicon substrate having a silicon membrane and an acoustic pipe and allowing a fluid to flow in said cavity to constitute a mechanical-acoustic vibration system measuring density.

CONSTITUTION: A silicon **membrane** 2 consisting of a silicon **oxide** film and a silicon **nitride** film is provided on a silicon substrate 1, and a first electrode 3, a **piezoelectric membrane** 4, a second electrode and a third electrode 5 are successively laminated to said **membrane** 2 and protected by a **protective** film 7. The central part of the back surface of the silicon substrate 1 is etched to form a cavity 12 and a silicon substrate 10 having an acoustic pipe 11 is fixed to the under surface of the substrate 1. A measuring fluid is introduced into the cavity 12 from the acoustic pipe 11 of the silicon substrate 10 and an acoustic vibration system is constituted of the acoustic capacity in the cavity 12 and the inertance of the fluid in the acoustic pipe 11 to measure the density and **pressure** of the fluid. At this time, the

thickness of the silicon membrane 2 forming the cavity 12 is prescribed to make it possible to miniaturize a vibrator. Since the vibrator is constituted based on the silicon membrane 2, this transducer can be miniaturized and inexpensively manufactured.

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